

Maricopa County Department of Transportation

**Geodetic Densification and Cadastral Survey
(GDACS)
W.O.# 40069012**

SPECIFICATIONS

**CHAPTER 3 – Ver 11
CADASTRAL SURVEY**

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Updates

In Version 10

1. The Updates area was created.
2. Under 3.6, the Calculated Position table changed to clarify when to use Z and Z1 on the drawing.
3. Revised section 3.10.2 “Plat Corner Determination Content” section.
4. Revised section 3.14.1 “Progress Reports”

In Version 11

5. In section 3.2 and 3.11, changed “Boundary” to “Corner Determination”
6. In section 3.6, added MCDOT to the point range “MCDOT: 70000 – 79999”
7. In section 3.8.3, adding the usage of a time stamp on the images.
8. Added a new section 3.11.1 Representing Adjacent Lines on a Corner Determination Survey, which moved the old 3.11.1 to 3.11.2.
9. Added subsection numbers to 3.6.
10. Added 3.6.7 , Ties and Accessories
11. Added additional instruction to 3.11 regarding when occupation procedure must be used.

3 Cadastral Survey

3.1 Project Goals

Each consultant will be given a scope of work (an area and/or number of corners) to generate a request for proposal and deliver to MCDOT. Areas will be distributed until the total project scope is complete.

The following is a list of monuments that shall be surveyed.

Corners to survey and refurbish/replace if necessary

- Section corners
- Quarter corners (East, West, North, and South)
- Closing corners
- Witness corners

Prima Fascia Survey (Search for but do not re-establish)

- Meander corners
- Indian Reservation Boundary markers (If the corner represents a section corner, treat as section corner)
- Tract corners (Only if the tract intersects section lines and the regular corner was not placed. Do not survey if it lies completely in a section)
- Angle points (As defined by the original survey per the PLSS)

3.2 Types of Surveys (Inventory vs. Corner Determination)

There are two types/levels of surveys that will be covered in these specifications.

- 1. Inventory Survey:** The purpose of the inventory survey is to obtain a preliminary list of existing monuments, specified by the contract scope and as correlated by section 3.1 of these specifications. The purpose is to aid MCDOT in determining what, if any, future actions will be taken. This survey is NOT indented to establish or check geodetic control in the area, nor is it a boundary survey to determine boundary / public land corners or lines.

Additional clarifications:

- The only search coordinates required are pre-calculated positions (i.e. SRP, QuadsUSA, GCDB ...)
No office calculations of plats or other instruments are necessary.
- The consultant should obtain a copy of the GLO notes for survey crew, at a minimum.
- Only minor field calculations are expected if any.

- 2. Corner Determination Survey:** The purposes of this survey type is to determinate and preserve United States Public Land Survey (USPLS) corners as specified by the contract scope and correlated with section 3.1 of these specifications. The section lines shown may not be the actual legal boundaries, due to the fact that controlling corners may exist that are not shown.

If any section(s) of these specifications do not specifically mention one or the other type of survey, it shall be assumed it pertains to both types.

3.3 Equipment and Personnel Required

- 1) Dual Frequency receivers.
- 2) TSC 1 version 7.1 or higher.
- 3) TGOoffice version 1.01 or higher.
- 4) Fixed Height tripod for base.
- 5) Fixed height range pole with 10 minute bullseye vial for rover. (The stock Trimble pole is only a 45 minute vial.)
- 6) Digital camera (recommend the Sony Mavica MVC-FD91 or equivalent)
- 7) A repeater for your RTK setup is recommended.

There must be at least one full time dedicated crew to this project with office personnel to support. It is the consultant's choice to add additional resources if desired.

3.4 GPS Software - TGOOffice

While working in TGOOffice, it is the choice of the consultant which projection is used (i.e. grid, grid scaled to ground, etc).

However, upon completion of the phase, the TGOOffice project must be submitted as specified under 3.3.1 TGOOffice Template – Coordinate System.



UNDER NO CIRCUMSTANCES SHALL A DATUM TRANSFORMATION TAKE PLACE AT ANY TIME DURING THE PROJECT.

There are specific criteria that must be adhered to while working on the project. They are as follows:

3.4.1 Feature and Attribute Table

MCDOT will supply a feature and attribute table.

Place them in the
"C:\Program Files\Trimble\Trimble Geomatics Office\System" directory.

3.4.2 Geoid Setup

MCDOT will supply a geoid file.

- 1) Place the AZGEO99.ggf file in you
C:\Program Files\Common Files\Trimble\GeoData directory.
- 2) Open **Coordinate System Manager**.
- 3) Go to the **Geoid Models** tab.
- 4) Right click anywhere in the white area and choose "**Add new model**".
- 5) In the Name field type **EXACTLY** "az geo 99 10_25_99"
- 6) Under the File name pull down menu choose : azgeo99.ggf
- 7) Under the **File** pull down choose **Save**.

3.4.3 TGOOffice Template

MCDOT will supply you with a Template in a zipped format.

Unzip the files and place in the
“C:\Program Files\Trimble\Trimble Geomatics Office\Template” directory.

Name: MCDOT GDACS XXXXXXXXXXXX
XXX = User defined.

General information in the template:

Coordinate System

- Projection: US State Plane 1983, Arizona Central 0202
- Datum: GRS 80
- Horizontal Adjustment: NONE
- Vertical Adjustment: Supplied in template.
- Geoid model: Arizona Sub-grid supplied by MCDOT

Recomputed

- Apply sea level corrections (terrestrial data): **OFF**
- **Tolerance Checking MUST be checked ON**
HORIZONTAL: 0.0105 m (0.035 ft)
VERTICAL: 0.0105 m (0.035 ft)
** Note: This is one-half of the total allowable error
because TGO uses a radial check from the average
position.
- Observation mean: Weighted

General

- Feature Coding: ON and set to GDACS.fcl

Any items not mentioned are left to the consultant.

3.4.4 TGOOffice Projects

After the template is installed.

- Create a new project for every township (unless instructed differently) using the following example: T01NR05E

Load pertinent primary and secondary stations into project.



- **Layers**

The following is a minimum list of layers:

- 1) **CONTROL** – This layer contains any primary or secondary control stations
- 2) **CALCULATED SEARCH** – This layer contains all calculated (search) positions.
- 3) **CALCULATED SET** – Contains positions of monuments that will be set.
- 4) **MEASURED FOUND ORIGINAL** – Contains all field measurements on found monuments.
- 5) **MEASURED SET NEW** – Contains all field measurements on all new monuments set.
- 6) **MEASURED SET REFURBISHED** - Contains all field measurements on refurbished monuments set.

If more detail is needed, line work is added, annotation applied, additional layers may be created with clear and easy to understand names.

- **Symbology**

The symbology is up to the user.

- **Color**

Regardless of the layer or symbology the color shall be in accordance with the following list:

- 1) **CONTROL** – Red
- 2) **CALCULATED SEARCH** – Blue
- 3) **CALCULATED SET** – Magenta
- 4) **MEASURED FOUND ORIGINAL** – Black/white (Depending on background color)
- 5) **MEASURED SET NEW** – Cyan
- 6) **MEASURED SET REFURBISHED** - Green

3.5 Survey Controller : TSC 1

3.5.1 Data Dictionary File

MCDOT will provide a data dictionary file which shall be uploaded into the TSC1.

3.5.2 Create a Custom GPS Survey Style

Style name: MCDOT GPS XXXXXXXXXXXXXXXX

Style type: GPS

The X's represent any thing you would like. You should designate different radios, GPS antennas or varying fixed height rover poles. You should create a Survey Style for each scenario.

Example: MCDOT GPS 47B 48R GRP PAC

(Denoting 4700 Base 4800 Rover with the Green Rover Pole with Pacific Crest radios)

Example: MCDOT GPS 4800 B & R BRP TRIM

(Denoting 4800 Base and Rover with the Black Rover Pole with Trimble Radios)

Any options not mentioned will be the Consultant's choice.



- **Rover options:**

PDOP mask:

6 (No corner shall be occupied with a PDOP over 6)

- **Topo point:**

Quality control:

QC1 & QC2

Occupation time:

0min 5sec

Number of measurements: 3

Horizontal precision:

0.020m

Vertical precision:

0.030m

- **Kinematic control point:**

Auto store point:

Yes

Quality control:

QC1 & QC2

RTK

Number of measurements: 90

Horizontal precision: 0.00 to 0.021m (.07 ft)

Vertical precision: 0.00 to 0.021m (.07 ft)

Postprocess

Time for 4 SVs:	10m0s
Time for 5 SVs:	8m0s
Time for 6+ SVs:	6m0s

3.5.3 Create a Custom Conventional Survey Style

Style name: MCDOT CONV XXXXXXXXXXXXXXXX

Style type: Conventional

The X's are consultant dependent; useful if your firm runs different model total stations.

Every option under this survey style will be dependent on the conventional brand of equipment that is used except for:

- **Duplicate point action:**

Duplicate point tolerance

<u>Horizontal:</u>	<u>0.00 to 0.021m (0.07 ft)</u>
<u>Vertical:</u>	<u>0.00 to 0.021m (0.07 ft)</u>

F1/F2 observation tolerance

Horizontal angle:	05"
Vertical Angle:	10"
Slope Distance:	0.010m

3.5.4 TSC 1 Job Naming Convention

You can either create the job in the TSC 1 or from TGOOffice. It is suggested that you use TGOOffice for a superior controlled environment. You are able to up load primary and secondary control points as well as your search coordinates.

TTTTRRRYYDDDN XXXXXXXXXXXXXXXX

Example: 02N05E0652 or 02N05E065A

- TTT: Township
- RRR: Range
- YY: Year
- DDD is the Julian day (065)
- N: A number or letter if you are running multiple rovers
- X: Other options are consultant dependent.

CAUTION: Be careful because the TSC's job name is different than the .dc file name. In TGOOffice when creating a .dc file you must click on the 'Configure' button in the Export dialog box to type in the **TSC1's job**

name. Use the naming convention for the TSC's job name and what ever you want for the .dc name. Once in the configure dialog box, make sure that WGS-84 Lat, Long and Height is also checked for the 'Output As' option.

The top of every DC file shall include the following information:

- Company
- Crew member names (Full last name).

3.6 Point Numbering

Every consultant is assigned a series of numbers:

AGRA	20000 – 29999
DEA:	30000 – 39999
ENTRANCO:	40000 – 49999
RBF:	50000 – 59999
WOOD PATEL:	60000 – 69999
MCDOT:	70000 – 79999

Each township shall be assigned a block of 500 point numbers in your assigned point range.

Prior to field occupation, each corner in the township shall be given a unique number in your point range. Once all the corners are numbered, the excess numbers can be used for miscellaneous control monuments or controlling topo features.

3.6.1 Search Coordinates

For The Corner

All search coordinates for a particular corner shall end with a letter starting at A and moving up progressively.

Example: **80125A** (Could be GCDB position)
 80125B (Could be a calculated position off a plat)
 and so on for multiple search coordinates on the same point.

For An Tie or Accessory

Any point number or name may be used, however it is impative that any search coordinate used be retained in TGO project on the “CALCULATED SEARCH” level. The field crew should make a note in the data collector file if the tie/accessory was not found (i.e. point xxx SFNF)

3.6.2 Surveying a Corner

When surveying a monument use the point number with a dash and a number.

Example: **12345-1** (First monument found, possible corner)
 12345-2 (Second monument found, possible corner)
 12345-3



Reminder: Each monument that is a **possible corner** shall be surveyed according to the GPS procedures as stated in 3.6.2 and shall be memorialized with images.

3.6.3 Calculated Positions

Once a corner is determined lost or obliterated and a position calculated for its reestablishment, use the assigned point number with a “Z” for staking out. Once the monument has been set, occupy new monument following the specification under 3.6 Occupation Procedures.

ENVIRONMENT	POINT NAME	COMMENT
In CAD	10000Z	Calculated position.
In the TSC	10000Z	Staking out calc'd position.
In the TSC	10000Z1	Shooting after installation.
On the Drawing Careful: Please make sure the coordinates reflect calculated (not measured) values, your elevation reflects measured (not calculated) and attributes are measured off the new monument for the coordinate table.	10000Z	Not set / monumented
	10000Z1	Set / Monumented

3.6.4 Modified / Refurbished Or Replaced Monuments

Occupy the substandard monument as outlined in 3.6. Once the monument has been modified, occupy it again following 3.6, **using the same point number as the original monument except add a “M” after**. Make sure it is placed on the refurbished / modified monument layer in TGOOffice.

Example: 12345-2M

3.6.5 Witness Corners

Refer to section 3.7 Monumentation for setting requirement and procedures. They shall be surveyed following the GDACS specifications. When shooting these monuments use the point number with a W1 and W2. (i.e. **12345-W1**)

Example: 12345-W1

3.6.6 Reference Monuments

Refer to section 3.7 Monumentation for setting requirement and procedures. They shall be surveyed following the GDACS specifications. When shooting these monuments use the point number with a R1 and R2.

**Example: 12345-R1
12345-R2**

3.6.7 Ties / Accessories

When a corner cannot be found or when it's position need to be verified, surveying other monuments called for on supporting records maybe required. When surveying these monuments that are not the corner but are ties or accessories to it, a “T#” shall be used.

The T is for “Tie”

The # symbol represents a number. There is no specific requirements to the number. It can be sequential starting at 1 or could correspond to the search number used to find the tie, it is up to the consultant.

**Example: 12345-T1
12345-T2
12345-T55**

..

3.7 Occupation Procedures



The following occupation procedures apply to any monuments that may be considered to be a corner and any monuments that are used to re-establish a corner.

3.7.1 Required Daily Routines

- Fixed Height Base bullseye bubble checked between all three legs.
- Rover pole(s) bullseye(s) checked.
- TIME STAMP in the TSC 1 should be checked before surveying.
- The first and last shot of the day must be check shots. A check may be performed on any other primary, secondary control station or any monument deemed reliable that was measured on a previous day.
 1. Use the 4-letter designation for the point number.
 2. Use CHK for the Code.
 3. Store it as a check shot.

3.7.2 GPS

Each corner and any monument that could be used to proportion (i.e. property corner, construction corner, ...) a lost or obliterated corner will be shot using the “Kinematic Control Point” method.

1. Gain an On The Fly (OTF) initialization at least 40 feet from monument.
2. Set up over monument with a bipod or equivalent.
3. Enter point number and take the shot.
4. Once shot is complete, physically lose initialization. Do not use the soft key to lose initialization. Physically cover antenna until you are tracking zero satellites.
5. Once initialization is lost, regain an OTF initialization at least 40 feet from the monument.
6. Once initialization is regained, re-approach monument and occupy it 180 degrees in the opposite direction from the first occupation. (i.e. If you were facing north the first time, face south the second time).
7. Enter the same exact point number and re-take shot. Store as a check shot.
8. If the second shot is not within tolerance, repeat steps 4 through 7 with an occupation at 90 degrees from the first two measurements.
9. If the tolerance is not meet within the 3 shots, leave and return at another time. (Discretion shall be used in difficult to reach locations.)

No more than 3 measurements are required for your first pass.

After office analysis is completed, all monuments out of tolerance will be identified and re-visited for a second time (minimum of one occupation). If the second visit to the monument does not satisfy the tolerance set forth, it shall be the consultant's discretion whether to accept or take further action.

Any abnormal situations should be reported to the GDACS project manager.

Feature Coding

The preferred method is before the shot, however if you enter the information during the shot, extra care must be taken not to disturb set up. The "Feature and Attributes" are outlined in Appendix C.



After the feature and attribute library is loaded in the TSC1, it must be activated for use. To activate the feature code library in the TSC1, go to the measurement screen (this is where you take a shot) and in the code field use the center pad and hit the right arrow. It will prompt you for the library and you may then choose "GDACS".

It is recommended to mark occupation number on or near the monument. (i.e. spray paint, marker, flagging with the point number)

3.7.3 Conventional

A minimum of 2 control points shall be set around the affected area using the same occupation procedure as section 3.6.2 . Using the TSC 1 for a data collector and in the same job, turn the required number of angles to a monument (corner) to achieve the tolerances specified in 3.4.1 under Kinematic Control Point Horizontal and Vertical Precision.

A back sight check shot must always be the last shot obtained for any given setup.

3.8 Pictures/Images - Cadastral Survey

If a monument is deemed to be of a substandard quality, the following series will need to be captured for both the found monument and the newly set monument.

3.8.1 Image Format

Images must be in jpeg (.jpg) format.

3.8.2 Image Size

All images must be at 640X480.

3.8.3 Content

A minimum of three images must be taken of each possible USPLSS corner. **Every image must clearly contain the point number and date observed of the monument in the following format. (In some circumstances additional verbiage may be needed to clarify the situation.)**

FONT: Arial

SIZE: 30

FONT STYLE: Bold

The use a time stamp on the photo is acceptable if legible on the image instead manually labeling the date. However, the point #/name still needs to be labeled using the above parameters.

The three images are as follows:

- 1) **AN EXTREME CLOSE UP** of the monument with a 6" ruler. The monument must be in focus and take up the majority of the photo. A mirror or flash may be necessary for monuments in hand holes.

Some monuments may require more than one close up image. An example would be a stone with markings on different or opposing sides. The image shall note the side in which the markings were found.

CORRECT

Image 1

INCORRECT

Image 2. Monument not large enough.

INCORRECT

Image 3 – Numbering – Even with different colors, it is still hard to read the point number.

Incorrect

Image 4. Shadow



Image 5. Focus

- 2) **A GENERAL CLOSE-UP.** Standing a few feet away, capture the monument and the surrounding ground.

CORRECT



Image 6 – Correct

CORRECT



Image 7 .

May be appropriate distance for stone with a mound.

INCORRECT



Image 8 - Focus and distance.

3) VICINITY

The image shall contain the best identifiable feature in the area along with the monument. The monument location shall be easily identified in the image by either physical means (i.e. someone pointing it out, a flagged lath ..) or graphically (i.e. adding graphic to the image to point it out)

CORRECT**Image 9 – Correct*****INCORRECT*****Image 10 – No date and Looks bad**

Any additional shots are more than welcome. However the image must clearly contain a legible point number.

3.8.4 File Naming Format

The image file names are left to the discretion of the consultant. The database input process will ultimately rename the image files, however it is crucial that the directory-naming format be followed.

3.8.5 Directory Naming Format

Each monument image file shall be kept in a individual and unique directory. The directory shall have the same “name” as the monument.

Example:

↳90000-2

📄 xxxx.jpg

📄 xxxx.jpg

...

..

↳90001-1

📄 xxxxx.jpg

..

↳90002-1

📄 xxxxx.jpg

3.9 Monumentation of Corners

This section only pertains to “boundary” type surveys.

Use the flow chart at the end of this section to determine when and what appropriate actions shall be taken.

3.9.1 Monument Materials

The monument materials will be supplied by MCDOT. They will be available at the Maricopa County DOT/FCD warehouse located at:

2222 South 27th Avenue
Phoenix, AZ 85009
Phone: 602-506-8036
Hours: M-F 5:30am - 3:30pm

For a list of obtainable materials see the GDACS web site under Consultants Corner. (<http://www.mcdot.maricopa.gov/survey>)

3.9.2 Monumentation Situation

When setting a new monument or modifying/refurbishing an existing monument, if the physical location of the corner position is impractical to set or unsafe to occupy the following alternatives may be used:

WITNESS CORNER(S)

Set one or two witness corners. These must be on the section line and located as close to the corner position as reasonably possible. In addition, they shall be stamped accordingly (WC , if two exist WC1 and WC2). Once set, the monuments shall be surveyed following the GDACS specifications. Refer to the Point Number section for proper annotation.

REFERENCE MONUMENTS

Set two reference monuments. These must not be on section line. These shall be stamped accordingly (RM).
A reasonable attempt shall be made to follow Section 4-16. Reference Monuments per the Manual of Surveying Instructions 1973, “When two monuments are used, they are usually placed equidistant and in opposite directions; an acceptable alternative is placement of the monuments so that the lines connection them

with the corner point are approximately perpendicular to each other. “.

Once set , the monument shall be surveyed following the GDACS specifications. Refer to the Point Number section for proper annotation.

NEW MONUMENTS

All new monuments set shall be either one of the following:

1. If the monument falls on solid rock or concrete not in a road or driveway. A Maricopa County concrete brass cap set with flowstone (hydraulic cement)
2. All other locations; 4 feet of stainless steel rod (2 – 2 foot sections) with a 3" compression fitted Maricopa County brass cap.

Natural ground (no road): Preferably driven flush unless circumstances dictate differently, use professional judgment.

Dirt Road: Recessed at least 0.5 feet (more if deemed necessary).

Asphalt Concrete / Concrete (Roadway): Depending on the composition of the AC, the preferred method is to drive the rod through the AC, ultimately making the top of the cap flush with the AC surface. If the AC is too thick, too hard or there are reasonable safety concerns, use your professional judgment, choosing from the following options (listed in no particular order):

- 1) Set one OR two witness corners. These must be on the section line and shall be stamped accordingly (WC). They shall be surveyed following the GDACS specifications. (See the Point Numbering section for more detail.)
- 2) Set two reference monuments. These must not be on the section line and shall be stamped accordingly (RM). They shall be surveyed following the GDACS specifications. (See the Point Numbering section for more detail.)
- 3) Pick up a pionjar from MCDOT and drill a hole through the AC. Set corner and survey per GDACS specifications.

4) Call the MCDOT project manager with an alternative action for review.

MODIFYING / REFURBISHING OR REPLACING A MONUMENT

Monuments that are found, accepted and are not properly identified will need to be modified or replaced. Monuments that are severely damaged will need to be refurbished or replaced. Monuments that are loose will need to be stabilized or replaced.

(Refer to the Point Number section for proper annotation)

REFURBISHING/MODIFYING

REBAR

MCDOT will supply a variety of sized aluminum caps to fit existing rebars that are accepted but are not properly identified.

PIPE

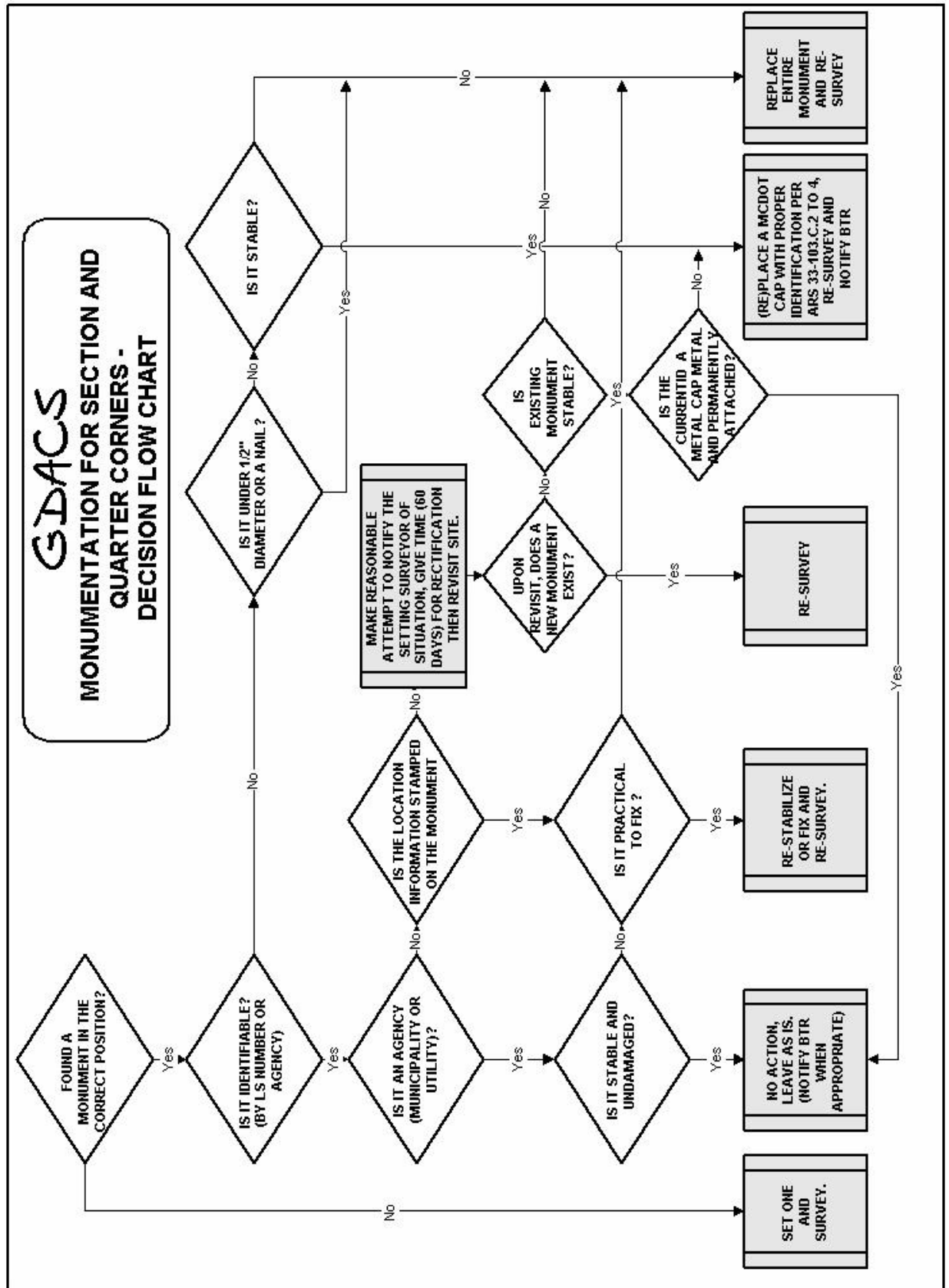
If a pipe is found and accepted with out a cap, in most cases the 9/16th stainless steel rod will be able to be driven into the pipe with the proper brass cap attached.

OTHER

If a situation arises that is not mentioned here, call the GDACS project manager to discuss a solution.

REPLACING A MONUMENT

See “NEW MONUMENTS” in this section.



3.10 Corner Determination Requirements

The section only pertains to “boundary” type surveys.

The goal for this section is to communicate key elements of your research and analysis for all corners determined. **Any research or analysis you do that is NOT documented is LOST and will need to be recreated in the future!**

The results produced from this section will be utilized on the “Results of Survey” drawing as well as in the monument database.

3.10.1 General Requirements

a. Recorded Plat or Document Table

When referencing any **record plat or document**:

1. Cite the county recorded in.
2. Cite the recording number and/or Book and Page when applicable. You may need to indicate book or document type depending on record keeping procedures.
3. Title of the instrument (plat or document)

b. Unrecorded Plats or Documents

When referencing any **unrecorded plat or document**, Cite all of the following that apply:

1. Date
2. Licensed surveyor
3. Firm or agency
4. Document/plat title.
5. Project number if existing

c. Keep detailed notes while analyzing each monument. Don't wait until you are completely done to start this process. You can organize them during or once the determination is complete. You will more than likely forget half of the documents or their significance if you wait.

3.10.2 General Area Timeline

Since the Phase 3 areas are generally following township lines, a general statement shall be made regarding the township or area as a whole. This statement shall chronicle the major surveys in the area from conception to present. These statements shall be placed above the corner determination table.

Example:

1915

The township lines were originally surveyed by the GLO in 1915 under the direction of John Smith. During which they placed stones at the corner positions.

1937

The township was when subdivided by GLO in 1937 under the direction of I.B. Right. During the 1937 survey, they placed stones at the corner positions.

1954

In 1954 BLM survey crew under the direction of I.C. Stars preformed a dependent resurvey setting lost corners and replacing stones with brass caps on pipes, normally the cap were set above ground. Mr. Stars replaced the interior townships corners, the west line and the north line.

Roughly 60 percent of the monuments recovered today are from the 1954 BLM survey. Our measurements generally agree with the 1954 BLM survey by 0.60 feet.

1960

In 1960, Arizona Public Service ran an overhead power line through sections 31 through 36 as indicated on an unrecorded plat, project number 60156-B, dated 5-20-1960 and signed by Mr. APS (Plat shall be referenced as APS60)

1985

In 1985 XYZ and Associates surveyed most of the west half of this township as evidenced by MCR 432-12. Our measurements agree with the 1985 XYZ survey generally by 0.10 feet.

Through the years many small surveys have been made in this area. There are roughly 75 surveys as noted by the MCDOT Plat index, some of which were used to determine existing corners and set obliterated corners.

3.10.3 Individual Corners

Since there are countless different corner determination situations that exist, there cannot be an exact specified method to use in producing a corner determination description for all corners. The following is a general guideline and should act as the minimum amount of data, when available, that should be represented in the description.

There are two types of corners; found/modified or set. In both cases the physical monument description should NOT be included here unless it is relevant to determination explanation. The physical monument description shall be found in the coordinate table.

Found / Modified Corners

There are four basic areas that should be addressed;

1. The origin of the monument.
 - a. When was the monument set?
 - b. Who was the LS?
 - c. What firm?
 - d. What source(s) did you find the information?
2. Documents (recorded or not) PHYSICALLY calling for the monument.
3. Documents (recorded or not) NOT PHYSICALLY calling for the monument but calling the position.

Set Corners

There are three basic areas;

1. What documents(recorded or not) or evidence are you using to re-establish the corner?
2. What method are you using? (single proportion, distance-distance, record bearing and distance, etc.)
3. Any records other than GLO, you must specify which points were utilized to facilitate the setting.

As a general rule for both found and set descriptions,

-It is very important that if there you state plat(s) that contradict your finds if it is likely others will be misled.

- It is highly encouraged to site dates and distances of closure when readily available.

There will undoubtedly be situations that need more information than given in these guidelines. The general rule “When in doubt spell it out!”. You should be telling a story, the best the story the more likely the monument will be used in perpetuity. The following are just a couple of examples of set and found corners.

Examples (Found Corners)

1. *The time and origin of who set the monument is unknown. No plats were found calling for the physical monument. R#, from 1964 is the oldest record found that substantially agrees with it's position but does not physically call for the monument.
The monument is accepted based upon common use.*
2. *The monument was set in 1978 per R2. The physical monument is also called for in R1, R3, R4 and U3. The position agrees with R2 within x.xx feet from the northeast of section 15(pt # 99998-2) and within x.xx feet from the northeast corner of 16(pt# 99999-1).
(or you could say, “The position substantially agrees with R2.”, or “The position agrees within x.xx feet of R2.”)
The monument is accepted based upon common use.*
3. *The monument was set sometime between 1973 and 1978 based on (my memory of the corner, all the document research).
The earliest plat physically calling for the monument is R25 from 1978.
The next earliest plat U4, from 1973 does not physically call for the monument but agrees in position within x.xx feet.
The earliest plat R6, from 1966 does not physically call for the monument but agrees in position within x.xx feet.*
4. *The monument was set by GLO in 1915 per U3. The monument as found appears to be undisturbed and substantially agrees with U3.*
5. *The monument was set by GLO in 1915 per U3. The monument as found has been disturbed but appears to be in the original position. The brass cap is gone and the iron pipe is bent. The point at which the iron pipe appears to straighten out has been accepted as the corner position. The monument's position substantially agrees with U3.*

Examples (Set Corners)

1. *The position was established by a distance-distance intersection. The first distance came from R6 using the intersection monument at This Road and That Road, being point 10000. The first second distance came from R13 using the northwest corner of section 7 being point 12345-2. Did not accept the position as called for in R3 and U4.*
2. *The position was established by double proportionate measurements using U1 from pt 10001-1, 10002-1, 10003-1 and 10004-1.*
3. *The position was calculated on a straight line between points 10005-1 and 10006-1 and on the latitudinal arc between 10007-1 and 10008-1.*
4. *The position was established by the record bearing and distance using U5 from point 10009-1 and correcting for magnetic declination.*
5. *The position was established by a distance-distance intersection per a MCDOT corner tie by J. Rose dated 1971. The corner tie calls for the original GLO stone. Two of the 5 ties were recovered, points 10010-3 and 10010-4. As a general note, this position does not agree with many recent surveys holding a monument about 35 feet south.*
6. *The position was established by parole evidence and a fence that appears to date back 40 to 50 years. The parole evidence was obtained by a previous land owner named Mr. Memory who used to own the property at 1234 W. East Road. He states he distinctively remembers a GLO monument about 1 foot west of the fence sticking up out of the ground. This agrees with the GLO notes. He said he would show it to friends and family from time to time.*

3.11 CAD Requirements

Depending on the type of survey under contract, "Inventory" vs. "Corner Determination", the requirements will differ. MCDOT will supply an example drawing for each type. The example drawings are intended to represent the format and content of the two different types of surveys.

The following are items of clarification that will be consistent to both types of drawings;

1. Microstation drawings are required (.dgn) and any conversion from another CAD platform shall be seamless, containing no formatting flaws.
2. For the most part, all drawings submitted must follow MCDOT's newly revised CAD standards. For additional information visit: <http://www.mcdot.maricopa.gov/fcg/default.htm>

This includes line styles, colors, weights, levels, and symbology, except when mentioned otherwise.

The following are requirements and/or exceptions to the official MCDOT CAD standards:

- Use the MCDOT GDACS cell library for all monumentation but use the CAD standards for all topo calls.
 - Use font style, size and weight as noted on sample "PLSS Subdivision Exhibit Drawing"
3. Sheet size: 24"x36"
 4. Scale: 1 inch = 1500 feet.
 5. Each township shall be contained in a singular .dgn file, unless noted otherwise.
 6. File Name Format: TTTRRR.dgn

TTT = Township

RRR = Range

Example: 03N04E.dgn

3.11.1 Representing Adjacent Lines on a Corner Determination Survey

When a survey of an adjacent township has been completed prior to your corner determination survey, the lines, symbols, point #'s and dimensioning from the adjacent plat will be transferred to and represented on your survey in a gray or half tone. No additional information will be placed in the coordinate table, record table or the corner determination table. Details may be required to adequately show dimensioning. They may be copied from the previously completed dgn file and pasted into your dgn.

The following note shall be placed on the cover sheet along the subject line.

THE CORNERS ALONG THE xxxxxx LINE OF THIS TOWNSHIP WERE **NOT** SURVEYED OR DETERMINED AS PART OF THIS TOWNSHIP PLAT. CONSEQUENTLY, THEY ARE NOT INCLUDED THE COORDINATE OR CORNER DETERMINATION TABLE. THEY ARE DISPLAYED HERE FOR REFERENCE PURPOSES ONLY. THESE CORNERS MAY HAVE CHANGED SINCE THE RECORDING OF THIS PLAT, PLEASE REFER TO THE MOST RECENT ADJACENT TOWNSHIP PLAT FOR ADDITIONAL INFORMATION.

3.11.2 Plat Approval

Data will be submitted on a per township basis, unless otherwise instructed.

Please refer to section 3.13 approval and delivery procedures.

3.12 Database

This section only applies to “boundary” type surveys.

MCDOT will supply a Microsoft Access database to each consultant. It will be the responsibility of each consultant to enter and quality check each corner entered into the database.

3.13 Monument Access

Due to the vast scope of this project, MCDOT will be relying on each firm to research and determine whose land each monument resides on for access. It will be the responsibility of each firm to gain access as needed. MCDOT will assist in whatever way possible.

3.14 Deliverables

All digital data can be transmitted either by ftp and/or CD. All items shall be delivered upon completion of a given phase, however MCDOT may request intermediate copies for quality control purposes.

3.14.1 Progress Reports

MCDOT reserves the right to require a report detailing the progress of each active phase no more than once a week.

This report, if required, shall be emailed to the GDACS project manager. Additional information may be warranted upon request.

3.14.2 Check Plots

All check plots will be submitted by email. At a minimum, the initial check shall be accompanied by a zipped copy of the TGO project.

3.14.3 Final Deliverables

INVENTORY SURVEY

1. (1) 11x17 inch paper copy.
2. CD containing:
 - Images
 - TGO project
 - Microstation Drawing
 - Misc project files.
3. Monument Summary Report (see GDACS web site or contact MCDOT project manager)
4. Cost proposal for boundary phase.

BOUNDARY SURVEY

1. (3) 24x36 inch mylar copies.
2. (1) 11x17 inch paper copy.
3. CD containing:
 - Images
 - TGO project
 - Microstation drawing
 - Database
 - Misc. project files.
4. All unrecorded documents/plats gathered for the project.

Exceptions or comments about any of the specifications must be in writing (email or other) to Brian Dalager with a cc to John Rose.